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(54) Paper sheet bending apparatus in bag making machine.

(57) The apparatus of this invention is adapted to automatically adjust width sizes of a plurality of guide plates for bending a paper sheet by making use of the computer.

The computer comprises a main computer (16) including first memory means (17) for storing sizes of various kinds of bags to be manufactured, and a correction value command computer (18) connected to the main computer and including second memory means (19) for storing a plurality of conditions of the paper sheet.

By making use of this correction value command computer, fine adjustment of the guide place can be easily made.

The main computer is connected to drive motors (11a - 11n) with an encoder through control units, (20a - 20n) etc.

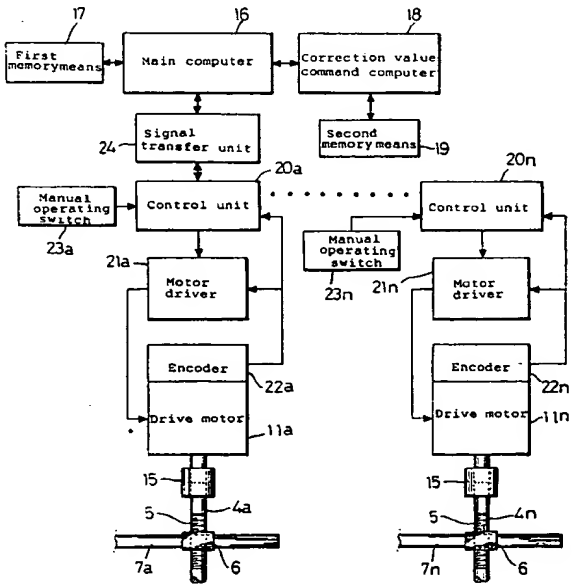
The output shaft (4a - 4n) of the drive motor is joined to the guide shaft laterally and axially supported by the frames.

A screw body (5) combined in one body with the guide plate (7) for bending a paper sheet is movably provided in a horizontal direction on the guide shaft.

A plurality of guide shafts and control units are provided in correspondence with the number of guide plates. The plurality of control units are connected to the main computer through a signal transfer unit.

An employment of such a configuration makes it possible to automatically carry out an adjustment of width sizes of respective guide plates in a short time, and to manufacture high accuracy bags with a square bottom.

Fig. 1



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BACKGROUND OF THE INVENTION

This invention relates to a paper sheet bending apparatus in a bag making machine. Particularly, this invention is suitable for manufacturing hand bags, portable bags, pocketbook, or vanity cases with a square bottom.

Heretofore, in the case of manufacturing hand bags with a square bottom using a paper sheet of a predetermined size which includes no score line, a paper sheet bending apparatus as described below was used at the manufacturing process thereof.

Namely, this paper sheet bending apparatus comprises a pair of left and right frames, a plurality of guide rollers laterally and axially supported by these frames with a predetermined spacing therebetween, a plurality of guide shafts arranged above or below these guide rollers, and a plurality of guide plates for bending a paper sheet provided through screw bodies on these guide shafts, respectively.

However, the apparatus constituted above has the drawbacks recited below:

(1) In the case of determining widths of respective guide plates, respective guide shafts had to be manually rotated. Accordingly, it took much time in adjustment of respective guide plates. Further, since adjustments of respective guide plates were made on the basis of experience, skillfulness was required.

(2) Rotational adjustments of respective guide shafts are carried out every time an expert manufactures respective bags. However, those adjustment contents could not be retained as data.

(3) Fine adjustments of respective guide plates are not easy, and it much time for such adjustments. As a result, the bag manufacturing efficiency could not be improved.

SUMMARY OF THE INVENTION

A first object is to automatically determine, in a short time, widths of a plurality of guide plates for forming a hand bag or a portable bag.

A second object is to permit even persons except for the expert to easily carry out fine adjustments in width determination of guide plates.

A third object is to retain, as data, the adjustment contents made by an operator to utilize later that data at the time of manufacturing various kinds of bags, thus to form higher precision bags.

The final object is to provide a scheme such that any error of width adjustments of respective guide plates which may be produced every time various kinds of bags are manufactured is not stored into the memory means of the computer.

To achieve the above-mentioned objects, a paper sheet bending apparatus in a bag making machine according to this invention comprises a main computer including first memory means for storing sizes of various kinds of bags to be manufactured, a correction value command computer connected to the main computer and including second memory means for storing a plurality of conditions of a paper sheet, a plurality of control units connected to the main computer through a signal transfer unit, a plurality of drive motors connected to these control units through motor drivers, respectively, a plurality of guide shafts respectively joined to drive shafts of these drive motors and laterally and axially supported by left and right frames, a plurality of guide plates for bending a paper sheet provided through screw bodies on these guide shafts, respectively, and a plurality of encoders respectively provided on the plurality of drive motors and adapted to individually sense quantities of rotations of the respective guide shafts to deliver sense signals to respective control units.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

FIG. 1 is an explanatory view showing an embodiment of this invention,

FIG. 2 is a schematic explanatory view showing the relationship between the guide plate and the computer of this invention,

FIG. 3 is a schematic explanatory view showing the essential part of this invention, and

FIGS. 4 and 5 are explanatory views showing a different embodiments of this invention, respectively.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

This invention will be described in detail in connection with embodiments shown.

In an embodiment shown in FIGS. 1 to 3, reference numeral 1 denotes left and right frames constituting a portion of a bag making machine. These frames 1 are faced to each other with a required spacing therebetween so as to permit a paper sheet 2 to flow in one direction.

Reference numeral 3 denotes a plurality of guide rollers laterally and axially supported by the frames 1. These guide rollers 3 are arranged in a horizontal state with a predetermined spacing therebetween. The paper sheet 2 is guided by these guide rollers 3 and a plurality of small guide rollers positioned above (not shown) and are moved in a direction indicated by an arrow.

Reference numeral 4 denotes guide shafts each having a male screw 5 at the position close to the one end portion thereof. These guide shafts 4 are laterally and axially supported by the left and

right frames above the guide rollers 3. A plurality of guide shafts 4 are provided in correspondence with the number of guide plates which will be described later. In FIG. 2, only one upper guide shaft 4 is shown for convenience of explanation. A plurality of guide shafts 4a to 4n are laterally and axially provided above and below the guide rollers 3 as shown in FIG. 3, respectively.

Reference numeral 6 denotes upper screw bodies screw-threadedly connected to the respective guide shafts 4 and moving in left and right directions.

Reference numeral 7 denotes first guide plates for bending a paper sheet provided in a horizontal state through supporting rods 8 below the screw bodies 6, respectively. Each first guide plate 7 and the upper screw body 6 are combined in one body. A pair of first guide plates 7 are provided on the left and right sides with the state of FIG. 3 being as a reference, respectively. It is to be noted only one screw body is provided on each guide plate. These first guide plates 7 are in the form of an elongated plate, and are provided perpendicular to the respective guide shafts 4. Further, first guide plates 7 are fixedly suspended by the screw bodies 6 with slight gaps between these first guide plates and the guide rollers 3, respectively.

Reference numeral 9 denotes second guide plates for bending a paper sheet provided between the first guide plates 7 and the frames 1, respectively. Each second guide plate 9 and the lower screw body 6 for moving the lower guide shaft 4 are combined in one body. A pair of second guide plates 9 are provided on the left and right sides so as to face the left and right first guide plates 7 as shown in FIG. 3, respectively.

Reference numeral 11 denotes a plurality of drive motors provided outside the frames 1 through supporting rods 12, a mounting plate 13, and mounting boxes 14, respectively. The drive shafts of the drive motors 15 are connected to one end portions of the upper and lower guide bodes 4 through joints 15, respectively.

Reference numeral 16 denotes a main computer including first memory means 17 for storing sizes of various kinds of bags to be manufactured. This main computer 16 outputs a signal to the control units so as to respectively permit the above-described guide shafts 4 to be rotated in accordance with a value calculated on the basis of a specific calculation formula in correspondence with an input size of a bag to be manufactured in no consideration of various conditions of a paper sheet which will be described later. In this embodiment, data inputted to the main computer 16 is sizes of length and breadth (width) of a bag to be manufactured. The main computer 16 computes sizes of length and breadth of the bag in a manner of the greatest common divisor to evaluate specific values, respectively.

Accordingly, where only this main computer 16 is utilized, adjustments of the first guide plates 7 become coarse.

Reference numeral 18 denotes a correction value command computer connected to the main computer 16 and including second memory means 19 for storing a plurality of conditions of a paper sheet. In this example, the plurality of conditions mean four input items of quality of the paper sheet, thickness of the paper, score line of the paper, and presence or absence of the surface processing. This correction value command computer 18 evaluates a specific correction value from the combination of a plurality of conditions to deliver a correction signal indicative of the correction value thus evaluated to the main computer 16.

Accordingly, where this correction value command computer 18 is used, adjustments of the first guide plates 7 result in fine adjustments.

Reference numeral 20 denotes a plurality of control units connected between the main computer 16 and the above-described drive motors 11, respectively. These control units 20 deliver signals transmitted from the main computer 16 to the drive motor 11 sides through motor drivers 21. Further, these control units 20 are connected to encoders affixed on the drive motors 11 to confirm width determination sizes of the first guide plates on the basis of signals sensed by the encoders 22 to deliver those signals to the main computer 16. Each motor driver 21 makes a comparison between an information signal from the control unit 20 and a sense signal from the encoder 22 to drive the drive motor 11 so that the size of width becomes equal to a width determination size transmitted from the main computer 16 side. Further, each encoder 22 senses a quantity of movement of the first guide plate 7 to deliver that sense signal to the motor driver 21 and the control unit 20.

Reference numeral 23 denotes a manual operating switches directly provided on the motor drivers 21, respectively. Each manual operating switch 23 is used in the case where data relating to various kinds of paper sheets 2 are not sufficiently stored in the correction value command computer 18, and therefore normal bags cannot be formed even by making use of correction values evaluated by the correction value command computer 18 at the time of manufacturing those bags. Additionally, reference numeral 24 denotes a single signal transfer unit provided between the main computer 16 and a plurality of control units 20a to 20n.

In the above-mentioned configuration, in the case of attempting to manufacture a hand bag with a square bottom, sizes of length and breadth of the hand bag are inputted to the main computer 16,

respectively.

Thus, the main computer 16 picks up a specific value from the first memory means 17 to send a signal to the motor driver 21 through the control unit 20. The motor driver 21 drives the drive motor 11 on the basis of this signal. When the drive motor 11 is driven, the guide shaft 4 is rotated. As a result, the first guide plate 7 moves so that a size of width becomes equal to a width determination size transmitted from the main computer 16.

When one adjustment of the first guide plate 7 is completed, a signal is transmitted from the signal transfer unit 24 to the next control unit 20b. As a result, the guide shaft 4b is rotated. Thus, another adjustment of the first guide plate 1 is carried out. When the determination of width of the first guide plate 7 is completed, signals are transmitted in sequence from the signal transfer unit 24 to the succeeding control units up to 20n, whereby determinations of widths of guide plates 7a to 7n are carried out, respectively.

Thereafter, an operator allows the paper sheet 2 to once flow into the bag making machine. If a desired bag is made up, this operation is considered to be "OK".

However, there are many instances where a normal hand bag cannot be ordinarily made up by simply inputting the sizes of that bag into the main computer 16. As stated above, when a normal bag cannot be made up, a plurality of conditions of the paper sheet 2 are inputted to the correciton value command computer 18. Thus, the correction value command computer 18 picks up a specific correction value from the second memory means 19 to output a signal indicative of an instruction of correction to the main computer 16. Upon receiving this instruction of correction, the main computer 16 sends a signal indicative of a correction value to the control unit 20 for a second time. As a result, the first guide plate 7 is finely adjusted. At this time, the operator allows a paper sheet to flow into the bag making machine for a second time. If a desired bag can be made up, this operation is considered to be "OK".

However, if a desired bag fails to be made up even by such an operation, the manual operating switch 23 is operated.

Thus, when the manual operating switch 23 is operated, a signal is transmitted from the control unit 20 to the motor driver 21, so the drive motor 11 is driven. As a result, the first guide plate 7 is slightly moved in a left or right direction. At this time, the encoder 22 senses a quantity of rotation of the guide shaft 4 to transmit this sense signal to the main computer 16 side through the control unit 20. As a matter of course, when the manual operating switch 23 was utilized in regard to the paper sheet, that operation is stored into the correction value command computer 18 as new data.

In a manner stated above, the paper sheet is desirably bent. Thus, a normal hand bag is completed.

A different embodiment of this invention will now be described.

It is to be noted that the same or similar reference numerals are attached to the same portions as those of the above-mentioned embodiment in making an explanation of the different embodiment, respectively, and the repetitive explanation will be omitted.

In the embodment shown in FIGS. 4 and 5, a new component is added to the above-described embodiment of this invention.

Namely, a plurality of origin sensors 26a ... 26n for sensing origins of the guide plates 7a ... 7n are connected to the control units 20a ... 20n, respectively. Each origin sensor is fixedly provided on the frame 1 through a supporting plate 27 as shown in FIG. 5.

In the above-mentioned configuration, in the case of making determinations of width of respective guide plates, a procedure is taken to move outwardly respective guide plates to once return them to the position of the origin (0) thereafter to carry out such width determinations.

As is clear from the foregoing description, this invention provides the advantages as recited below.

(1) Since it is possible to automatically adjust guide plates for bending a paper sheet, any improvement in the efficiency of adjustment work can be made in manufacturing hand bags with other different square bottom.

(2) Since the correction value command computer is connected to the main computer, fine adjustments of guide plates are carried out with ease.

(3) Even if an operator is not an expert, he can carry out width determinations of respective guide plates simply and in a short time.

(4) In the case of the embodiment where the manual operating switch is provided in the control unit, a desired bag can be manufactured even when various conditions relating to a paper sheet of a bag to be manufactured are not inputted into the correction value command computer.

(5) Every time the manual operating switch is utilized, new data can be stored in sequence into the correction value command computer through the encoder and the control unit, etc. Accordingly, according as the number of times of fine adjustments of the guide plate increases, the accuracy of data of the correction value command computer increases.

(6) In the case of the embodiment where origin sensors are connected to respective control

units, errors in the adjustment of the guide plate moving through the screw body are not stored into the correction value command computer. Accordingly, high accuracy adjustment can be made at all times.

Reference Numeral Table

FIGS. 1 to 3

1	Frame
2	Paper sheet
3	Guide roller
4	Guide shaft (Mail screw 5)
6	Screw body
7	First guide plate
8	Supporting rod
9	Second guide plate
11	Drive motor
12	Supporting rod
13	Mounting plate
14	Mounting box
15	Joint
16	Main computer
17	First memory means
18	Correction value command computer
19	Second memory means
20	Control unit
21	Motor driver
22	Encoder
23	Manual operating switch
24	Signal transfer unit

FIGS. 4 and 5

26a, 26b ..... 26n ..... Origin sensor
27 ..... Supporting plate

Claims

1. A paper sheet bending apparatus in a bag making machine comprising: a main computer including first memory means for storing sizes of various kinds of bags to be manufactured; a correction value command computer connected to said main computer and including second memory means for storing a plurality of conditions of a paper sheet; a plurality of control units connected to said main computer through a signal transfer unit; a plurality of drive motors connected to said control units through motor drivers, respectively; a plurality of guide shafts respectively joined to drive shafts of said drive motors and laterally and axially supported by left and right frames; a plurality of guide plates for bending a paper sheet provided through screw bodies on said guide shafts, respectively; and a plurality of encoders respectively provided on said plurality of drive motors and adapted to individually sense quantities of rotations of said respective guide shafts to deliver sense signals to said respective control units.

2. A paper sheet bending apparatus in a bag making machine as set forth in claim 1, wherein said control units are provided with manual operating switches, respectively.

3. A paper sheet bending apparatus in a bag making machine as set forth in claim 1, wherein origin sensors for sensing origins of guide plates are connected to said control units, respectively, each of said origin sensors being fixedly provided on said frame through a supporting plate.

Fig. 1

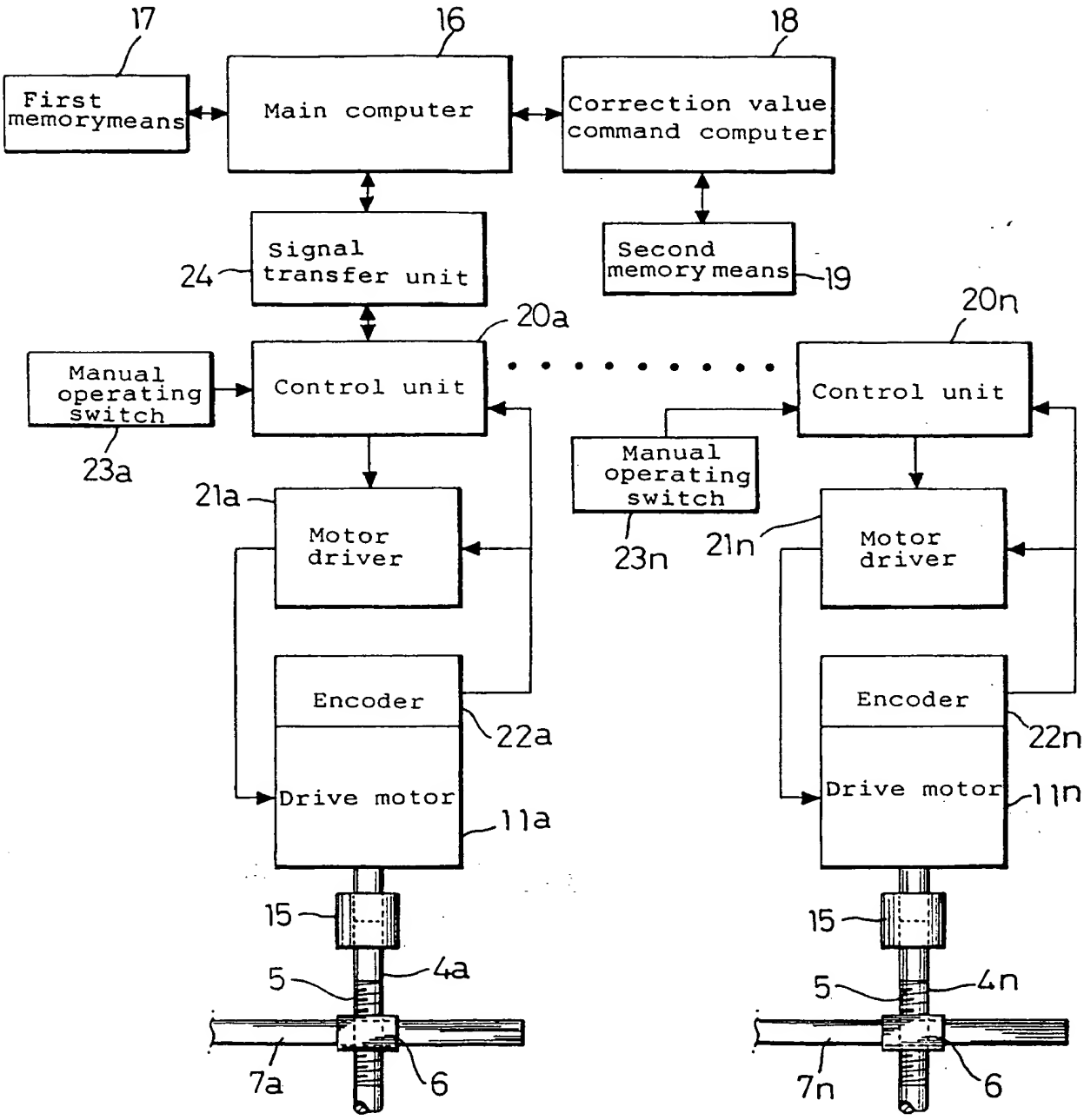


Fig.2

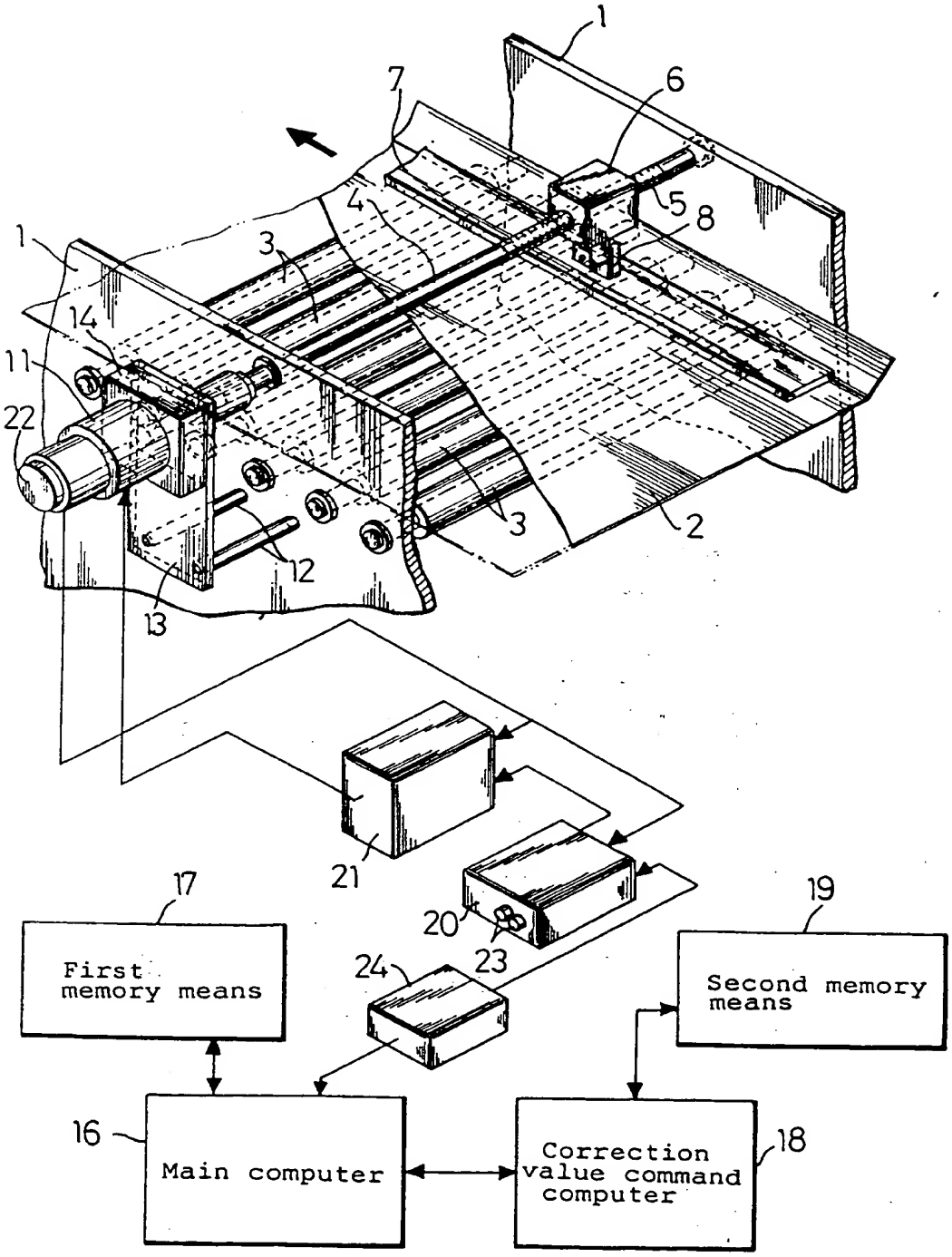

1
7
6
4
5
8
1
3
14
11
22
3
2
12
13
21
17
19
20
23
24
First memory means
Second memory means
16
Main computer
Correction value command computer
18

Fig.3

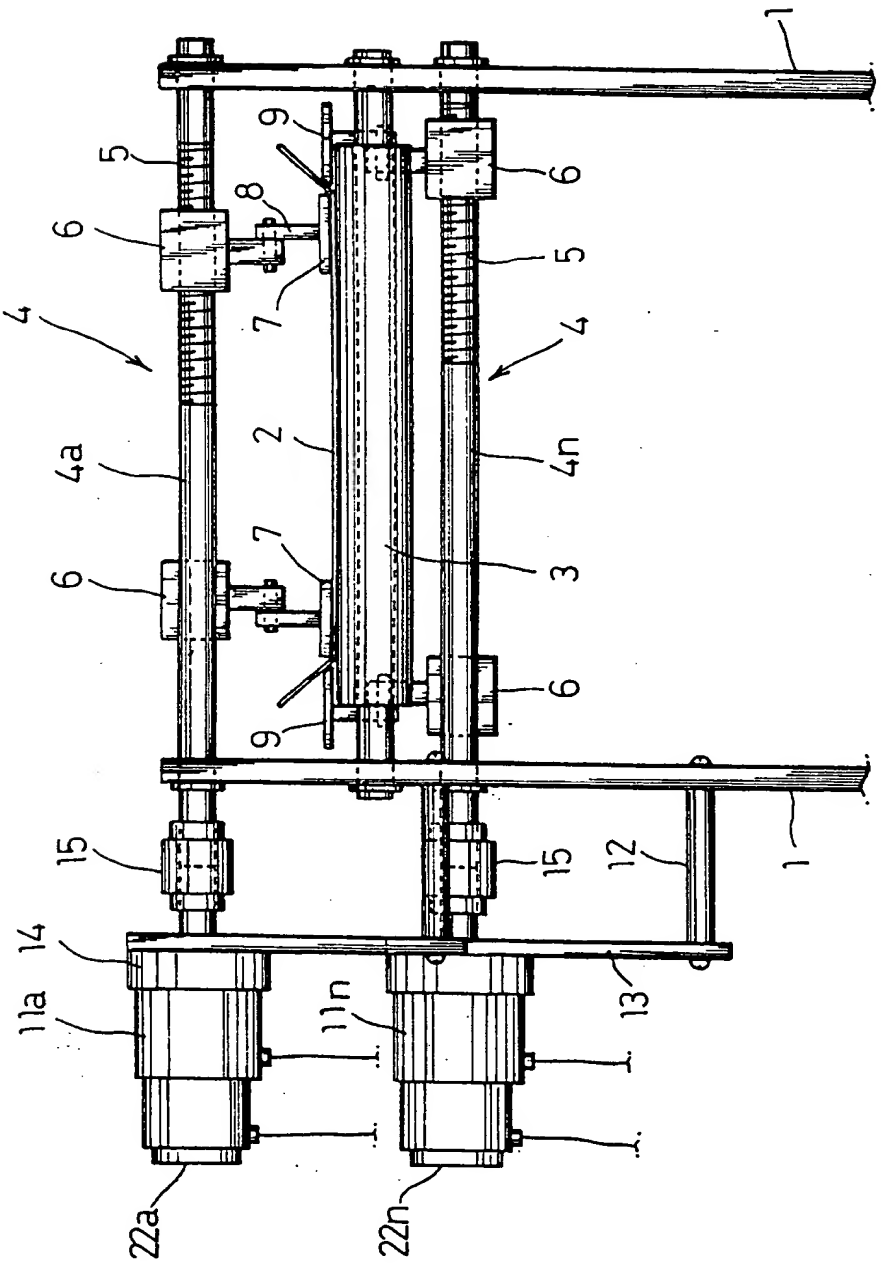


Fig. 4

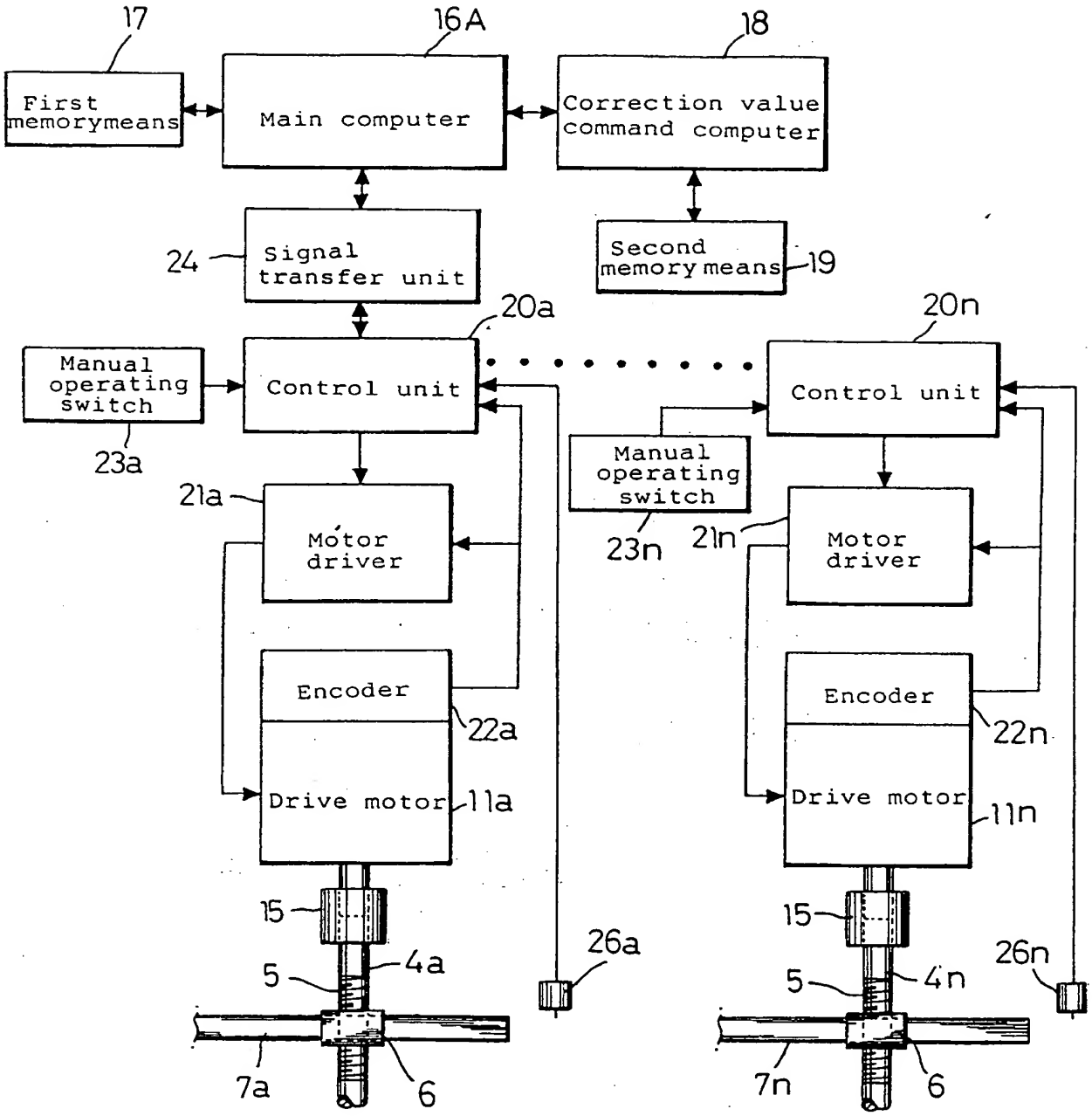
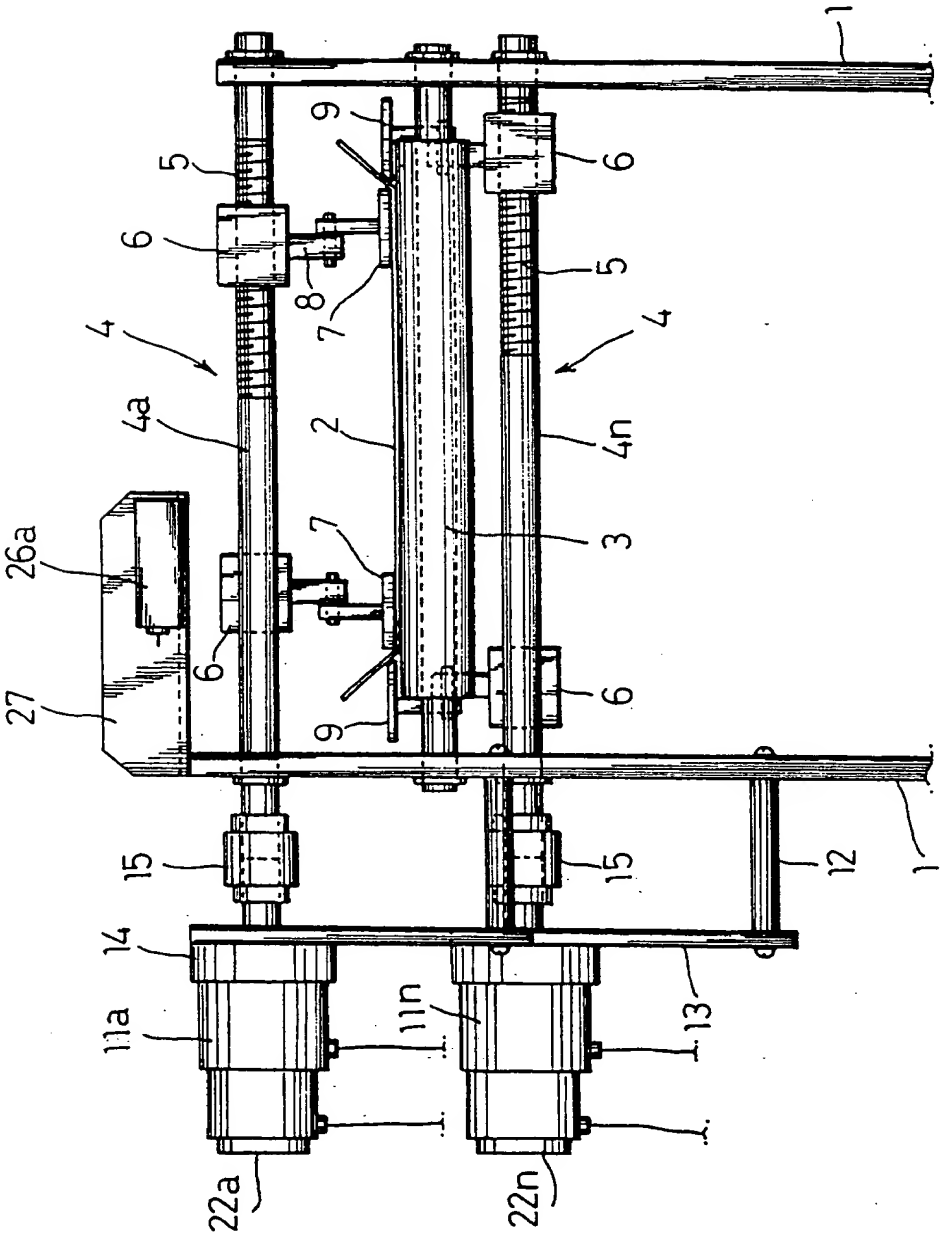

17
16A
18
First memorymeans
Main computer
Correction value command computer
24
Signal transfer unit
Second memory means
19
20a
20n
Manual operating switch
Control unit
Control unit
23a
Manual operating switch
21a
Motor driver
23n
21n
Motor driver
Encoder
22a
Encoder
22n
Drive motor
11a
Drive motor
11n
15
15
26a
26n
5
4a
5
4n
7a
6
7n
6

Fig.5



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EUROPEAN SEARCH REPORT

Application Number

EP 90 31 1395

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	GB-A-2 229 961 (SEISAKUSHO) * Abstract; figures *	1-3	B 31 B 19/74
A	DE-A-2 912 731 (DAINIPPON)		
A	GB-A-2 144 368 (TANABE)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 31 B

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	31 May 91	PEETERS S.

CATEGORY OF CITED DOCUMENTS

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